

What is claimed is:

1. A temperature compensated crystal oscillator comprising:  
a oscillation circuit that has a piezoelectric vibrator having  
5 a piezoelectric element which is excited in a predetermined  
frequency, and an oscillation amplifier that excites the  
piezoelectric element by flowing a current to the piezoelectric  
element; a vibrator current controller that controls a current  
of the piezoelectric vibrator; a temperature compensation  
10 circuit that compensates for temperature characteristics of the  
piezoelectric vibrator; and a variable capacitance diode that  
changes the oscillation frequency by changing the load  
capacitance of the oscillation circuit using an external voltage,  
wherein

15 the temperature compensation circuit generates a  
functional voltage that compensates for the temperature  
characteristics of the piezoelectric vibrator, and inputs the  
functional voltage to the vibrator current controller, thereby  
to control the vibrator current to change the oscillation  
20 frequency of the oscillation circuit so as to compensate for  
the temperature characteristics of the piezoelectric vibrator,  
and the temperature compensation circuit changes an application  
voltage of the variable capacitance diode using the external  
voltage, thereby to change the oscillation frequency of the  
25 oscillation circuit.

2. A temperature compensated crystal oscillator comprising:

a oscillation circuit that has a piezoelectric vibrator having a piezoelectric element which is excited in a predetermined frequency, and an oscillation amplifier that excites the piezoelectric element by flowing a current to the piezoelectric element; a vibrator current controller that controls a current of the piezoelectric vibrator; a temperature compensation circuit that compensates for temperature characteristics of the piezoelectric vibrator; and a variable capacitance diode that changes the oscillation frequency by changing the load capacitance of the oscillation circuit using an external voltage, wherein

the temperature compensation circuit generates a functional voltage that compensates for the temperature characteristics of the piezoelectric vibrator, and applies the functional voltage to the variable capacitance diode to change the load capacitance of the oscillation circuit, thereby to change the oscillation frequency of the oscillation circuit so as to compensate for the temperature characteristics of the piezoelectric vibrator, and the temperature compensation circuit changes a voltage to be input to the vibrator current controller using the external voltage, thereby to change the oscillation frequency of the oscillation circuit.

3. The temperature compensated crystal oscillator according to claim 1 or 2, wherein

a reactance element that changes the oscillation frequency of the oscillation circuit by changing the load capacitance is

further inserted into the load of the oscillation circuit.

4. The temperature compensated crystal oscillator according to claim 1 or 2, wherein

5 a variable reactance element that changes the oscillation frequency of the oscillation circuit by changing the load capacitance is further inserted into the load of the oscillation circuit, and the capacitance of the variable reactance element is changed from the outside of the oscillator thereby to control  
10 the oscillation frequency of the oscillation circuit.

5. The temperature compensated crystal oscillator according to claim 1, further comprising:

a correction variable capacitance diode that corrects a  
15 compensation distortion generated by changing the load capacitance, wherein

the correction variable capacitance diode corrects a compensation distortion generated by changing the load capacitance of the vibrator current controller using a functional  
20 voltage that is generated by the temperature compensation circuit.